scattering layer to be in contact with an electrode **12** or **16** so long as it does not unduly disturb the generation of light in the OLED layers **14**. According to an embodiment of the present invention, light emitted from the organic layers **14** can waveguide along the organic layers **14** and electrodes **12** combined, since the organic layers **14** have a refractive index lower than that of the transparent electrode **12** and electrode **16** is reflective. The scattering layer **22** or surface **25**, **27** disrupts the total internal reflection of light in the combined layers **14** and **12** and redirects some portion of the light out of the combined layers **14** and **12**.

[0043] It is important to note that a scattering layer will also scatter light that would have been emitted out of the device back into the layers **14**, exactly the opposite of the desired effect. Hence, the use of optically transparent layers that are as thin as possible is desired in order to extract light from the device with as few reflections as possible.

[0044] The present invention is preferred over the prior art because the number of interlayer reflections that the light encounters and the distance that scattered light travels in the encapsulating cover **20** (for a top-emitter) or substrate **10** (for a bottom-emitter) are reduced. Referring to **FIG. 9**, after light rays **6** are scattered into an angle that allows it to escape from the organic layers **14** and transparent second electrode **12**, it enters the transparent low-index element **18** (for example, air) that has a lower index of refraction than both the transparent electrode **12** and the encapsulating cover **20** or substrate **10**. Therefore, when the scattered light encounters the encapsulating cover **20** or substrate **10**, it will pass through the encapsulating cover **20** (or substrate **10** for a bottom-emitter configuration) and be re-emitted on the other side, since light passing from a low-index medium into a higher-index medium cannot experience total internal reflection. Hence, the light will not experience the losses due to repeated transmission through the encapsulating cover **20** or substrate **10**, or demonstrate the lack of sharpness that results from light being emitted from the organic layers **14** at one point and emitted from the encapsulating cover **20** or substrate **10** at a distant point, as illustrated in **FIGS. 15 and 16**. To facilitate this effect, the transparent low-index element **18** should not itself scatter light, and should be as transparent as possible. The transparent low-index element **18** is preferably at least one micron thick to ensure that emitted light properly propagates through the transparent low-index element and is transmitted through the encapsulating cover **20**.

[0045] Whenever light crosses an interface between two layers of differing index (except for the case of total internal reflection), a portion of the light is reflected and another portion is refracted. Unwanted reflections can be reduced by the application of standard thin anti-reflection layers. Use of anti-reflection layers may be particularly useful on both sides of the encapsulating cover **20**, for top emitters, and on both sides of the transparent substrate **10**, for bottom emitters. Referring to **FIG. 12**, an anti-reflective layer **21** is illustrated on the outside of transparent cover **20**.

[0046] The transparent low-index element **18** is useful for extracting additional light from the OLED device. However, in practice, if a void or gap (filled with a gas or is a vacuum) is employed in a top-emitter configuration as a transparent low-index element **18**, the mechanical stability of the device may be affected, particularly for large devices. For example, if the OLED device is inadvertently curved or bent, or the encapsulating cover **20** or substrate **10** are deformed, the encapsulating cover **20** may come in contact with the transparent electrode **12** and destroy it. Hence, some means of preventing the encapsulating cover **20** from contacting the transparent electrode **12** in a top-emitter OLED device may be useful. Referring to **FIG. 10**, according to another top-emitter embodiment of the present invention having a scattering layer **22** located over the transparent electrode **12**, the organic material layer **14** and the electrodes **12** and **16** may be surrounded, partially or entirely, by a raised area **24**. The raised area **24** can be in contact with the encapsulating cover **20**. By providing a mechanical contact between the encapsulating cover **20** and the substrate **10** within or around the light-emitting area of the device, the OLED device can be made more rigid and a gap or void serving as transparent low-index element **18** created. Alternatively, if flexible substrates **10** and covers **20** are employed, the raised areas **24** can prevent the encapsulating cover **20** from touching the OLED material layer(s) **14** and electrode **12**. Such raised areas may be made from patterned insulative materials employed in photo-lithographic processes for thin-film transistors construction in active-matrix devices. The scattering layer **22** may, or may not, be coated over the raised areas **24**.

[0047] Referring to **FIG. 11**, another top-emitter embodiment of the present invention having a multi-layer anode with a scattering layer **22** between the reflective **15** and transparent **13** layers is illustrated. Various embodiments of the invention, including the embodiments of **FIGS. 10 and 11**, have the advantage that they may be readily manufactured by coating scattering particles, such as titanium dioxide, on inorganic layers without disturbing the organic layers **14**, therefore enabling a higher-yield manufacturing process. For example, spin coating may be employed. Alternatively, in the embodiment of **FIG. 11**, photolithographic processes may be employed to create :scattering structures in the layer **22**.

[0048] The raised area **24** may be provided with reflective edges to assist with light emission for the light that is emitted toward the edges of each light-emitting area. Alternatively, the raised area **24** may be opaque or light absorbing. Preferably, the sides of the raised areas **24** are reflective while the tops may be black and light absorbing. A light-absorbing surface or coating will absorb ambient light incident on the OLED device, thereby improving the contrast of the device. Reflective coatings may be applied by evaporating thin metal layers. Light absorbing materials may employ, for example, color filters material known in the art. Raised areas within an OLED device are also known in the art and are found, for example in Kodak OLED products such as the ALE251, to protect thin-film transistors and conductive contacts. Construction and deposition techniques are known in the art. A useful height for the raised area above the surface of the OLED is one micron or greater. An adhesive may be employed on the encapsulating cover **20** or raised areas **24** to affix the encapsulating cover **20** to the raised areas **24** to provide additional mechanical strength.

[0049] The scattering layer **22** can employ a variety of materials. For example, randomly located spheres of titanium dioxide may be employed in a matrix of polymeric material. Alternatively, a more structured arrangement employing ITO, silicon oxides, or silicon nitrides may be used. In a further embodiment, the refractive materials may